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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/056,179	01/22/2002	Theodore M. Taylor	MI22-1824	9467

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EXAMINER

WEISS, HOWARD

ART UNIT PAPER NUMBER

2814

DATE MAILED: 06/20/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/056,179

Applicant(s)

TAYLOR, THEODORE M.

Examiner

Howard Weiss

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 May 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 49-69 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 49-69 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Art Unit: 2814

Attorney's Docket Number: MI22-1824

Filing Date: 1/22/02

Continuing Data: none

Claimed Foreign Priority Date: none

Applicant(s): Taylor

Examiner: Howard Weiss

Election/Restrictions

1. The Applicant's election of Group I, Claims 49 to 69, in Paper No. 5 is acknowledged. Claims 1 to 48 have been canceled.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

- (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
- (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

4. Claims 49, 50, 53, 55, 56, 61, 62 and 63 are rejected under 35 U.S.C. 102(e) as being anticipated by Yu et al. (U.S. Patent No. 6,376,877).

Yu et al. show all aspects of the instant invention (e.g. Figure 7A) including:

- a semiconductive substrate **102**
 - a pair of STI masses **316A**, **317A** with first portions within the substrate and second portions projecting outwardly from the substrate and having first W_F and second W_C cross-sectional dimensions where $W_C > W_F$
 - a first dielectric layer **306A**
 - a floating gate **308A** with a concave upper surface and which does not fill the region between the second portions of said STI masses
 - a second dielectric layer **310A** and a control gate **312A**
5. Claims 49, 51, 58, 61, 62, 66 and 68 are rejected under 35 U.S.C. 102(e) as being anticipated by Ding et al. (U.S. Patent No. 6,214,667).

Ding et al. show all aspects of the instant invention (e.g. Figure 2F) including:

- a semiconductive substrate **200**
 - a pair of STI masses **214**, **216** with first portions within the substrate and second portions projecting outwardly from the substrate and having first and second cross-sectional dimensions which are essentially equal
 - a first dielectric layer **204**
 - a floating gate **222a** with a concave upper surface and which fills the region between the second portions of said STI masses
 - a second dielectric layer **224** and a control gate **226**
6. Claims 49, 50, 53, 58, 59, 61, 63, and 66 are rejected under 35 U.S.C. 102(e) as being anticipated by Hsieh et al. (U.S. Patent No. 6,153,494).

Hsieh et al. show all aspects of the instant invention (e.g. Figure 3e) including:

- a semiconductive substrate **100**
- a pair of STI masses **240**, **250** with first portions within the substrate and second portions projecting outwardly from the substrate and having first and second cross-sectional dimensions which are essentially equal

- a first dielectric layer **260**
- a floating gate **270** with a concave upper surface and which does not fill the region between the second portions of said STI masses
- a second dielectric layer **280** and a control gate **290**

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 52, 54, 57 and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yu et al. and Shirai et al. (IEDM 1995).

Yu et al. show most aspects of the instant invention (Paragraph 4) except for the rugged outermost surface of said floating gate being made of hemispherical grain polysilicon (HSG Poly-Si). Shirai et al. teach (e.g. see Abstract) to roughen up the outer surface of a floating gate using HSG Poly-Si to increase the capacitive-coupling ration of the memory cell. It would have been obvious to a person of ordinary skill in the art at the time of invention to roughen up the outer surface of a floating gate using HSG Poly-Si as taught by Shirai et al. in the device of Yu et al. to increase the capacitive-coupling ration of the memory cell.

9. Claims 52, 54, 65 and 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ding et al. and Shirai et al. (IEDM 1995).

Ding et al. show most aspects of the instant invention (Paragraph 5) except for the rugged outermost surface of said floating gate being made of hemispherical grain polysilicon (HSG Poly-Si). Shirai et al. teach (e.g. see Abstract) to roughen up the

outer surface of a floating gate using HSG Poly-Si to increase the capacitive-coupling ration of the memory cell. It would have been obvious to a person of ordinary skill in the art at the time of invention to roughen up the outer surface of a floating gate using HSG Poly-Si as taught by Shirai et al. in the device of Ding et al. to increase the capacitive-coupling ration of the memory cell.

10. Claims 52, 54, 60, 64 and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsieh et al. and Shirai et al. (IEDM 1995).

Hsieh et al. show most aspects of the instant invention (Paragraph 6) except for the rugged outermost surface of said floating gate being made of hemispherical grain polysilicon (HSG Poly-Si). Shirai et al. teach (e.g. see Abstract) to roughen up the outer surface of a floating gate using HSG Poly-Si to increase the capacitive-coupling ration of the memory cell. It would have been obvious to a person of ordinary skill in the art at the time of invention to roughen up the outer surface of a floating gate using HSG Poly-Si as taught by Shirai et al. in the device of Hsieh et al. to increase the capacitive-coupling ration of the memory cell.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Doan (U.S. Patent No. 6,271,561) and Kobayashi et al. (IEDM 1997) teach similar device as the instant invention.

12. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Art Unit 2814 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(703) 308-7722** or **-7724**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications. The official TC2800 Before-Final, **(703) 872-9318**, and After-Final,

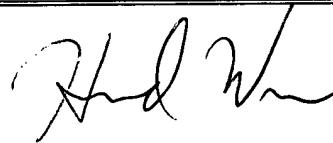
(703) 872-9319, Fax numbers will provide the fax sender with an auto-reply fax verifying receipt of their fax by the USPTO.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard Weiss at **(703) 308-4840** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via **Howard.Weiss@uspto.gov**.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group 2800 Receptionist at **(703) 308-0956**.

14. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 257/317, 510	6/17/02
Other Documentation: PLUS Analysis Report	6/12/02
Electronic Database(s): EAST	6/17/02



Howard Weiss
Examiner
Art Unit 2814

HW/hw
17 June 2002